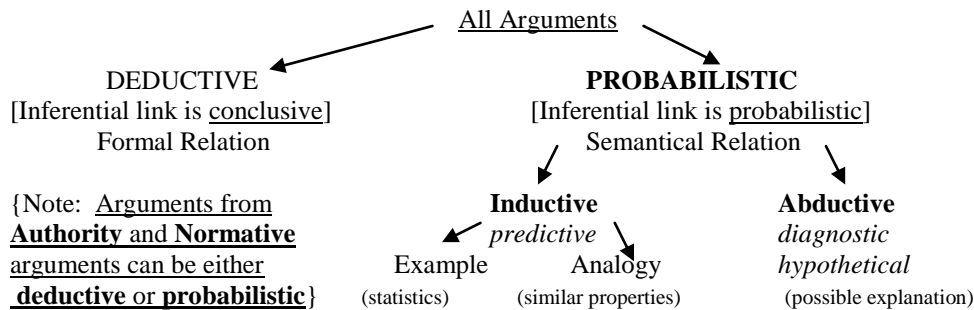


What is an argument?

An argument is a **collection of statements, one of which is the conclusion while the rest are premises which support the conclusion.** A **coherent argument** is an argument with plausible premises and an appropriately strong inferential connection. The conditions for cogency will depend on the kind of argument being evaluated as well as the context for the argument.



The Basic Process of Constructing Arguments

➤ Articulate Purpose

You begin the process by understanding the problem or asking the question. Why are you concerned with thinking something through? This part of the process is very important since it will determine how to proceed with the other stages in the process.

➤ Gather Information

After you have determined what the problem or question is, then you must gather information to help you solve the problem or answer the question.

➤ Organize Information to Construct Argument

Once you have done your research and feel reasonably sure that you have enough accurate information, then you must figure out how to organize that information. In constructing an argument, this means determining which of the three main argument strategies – Abductive, Inductive or Deductive -- will be most appropriate to your purpose.

Argument Analysis follows a similar pattern. The argument is summarized in a **schematization**, the type of argument is identified and its **inference strength** determined -- , and finally the **plausibility** of premises are checked for accuracy and truth. In this course, we will be using this basic process of argument analysis to learn how to recognize and construct strong arguments.

Argument at Work: The Scientific Method

The scientific method involves all of the *-ductives*, which are the strategies of scientific reasoning. According to the philosopher, Charles Saunders Peirce, the scientific method involves a sequence of reasoning which is quite crucial to our collective opportunity to learn the “reality of things”. Peirce thought that reasoning operates in three stages: first -- abductive questioning -- which hypothesizes the range of possible explanations or causes; second -- deductive reasoning -- which derives the implications of those possibilities; and third -- inductive testing -- which determines probable truth.

Abductive reasoning allows us to speculate upon and capture possibilities thus creating new hypotheses which we can subject to tautological (syllogistic, deductive certainty) and empirical (probability) evaluation. Peirce argued that **deductive reasoning** does not teach us anything new. Rather deductive reasoning teaches us by *tautology* [saying the “same thing”] what is involved in what we already know [or assume we know]. **Inductive reasoning** helps us to acquire new knowledge through the synthesis of what we know already. So inductive reasoning offers “new knowledge” to an extent. However, abductive reasoning is the only reasoning strategy which can deal with the possibilities of the truly new. We use this abductive process to gain access to new knowledge in two ways:

- We may reason from consequent to antecedent; that is, we may reason from we actually experience (the empirical inductive process) to what may well have (or, must have) preceded this experience. This reasoning in reverse [*retroduction*] uses the certainty of what is in order to determine what must have been the cause of what is.
- We may reason from *amusement* – a type of speculative, yet logical engagement with reality in order to engage in the playful creation of explanatory hypotheses concerning the reality we encounter. Amusement is playful participation; a-musement, by contrast, is being entertained. Amusement is active reverie or even daydreaming. Amusement is passive reception of pleasing stimuli.

The scientific method involves abductive arrival at hypotheses which become the premises of deductive syllogisms whose certain conclusions we then examine through the inductive process of empirical evaluation. This is the real source of new knowledge

Are arguments based on objective reasons better than arguments based on subjective reasons?

For our purposes, there is no difference between the two kinds of reasons as such. Concepts like 'plausibility' and 'cogency' are by their very nature subjective while notions of 'validity' or 'soundness' are objective.

Objective simply designates that the truth value of the premise in question can be considered as being **independent of the mind** and so does not automatically confer either rationality or relevance to the argument. *For example, during the Middle Ages, most people in Europe mistakenly believed that the world was flat and this belief did not effect the actual shape of the world which continued to be round regardless of what people believed about it [or even if there are any people to believe anything at all].*

Subjective means that the truth value of a premise is **subject [mind] dependent** in the sense that it is based on a judgment about experience rather than a matter of fact that can be established independently of experience. [This distinction avoids the assumption that subjective judgments are automatically irrational and so opens the possibility of arguing about values, which are subjective by nature.] *For example, based on my experience of comparing my evaluation of a film with reviews of those films by Siskel and Ebert, I consider it more probable that I will agree with Ebert than with Siskel about the value of the film while we all agree about the film's objective features such as plot line or how long it lasted.*

The Roles of Instinct and Emotion in Rational Thinking

It is very easy to get trapped into believing that there is no room for passion or spontaneity when we think critically or that the autonomous intellect is the only source for Critical Thinking. This belief is especially convincing because we keep on reminding ourselves that Critical Thinking is clear, careful and logical reasoning in pursuit of TRUTH. However, nothing could be further from the reality of who we are. In fact, that is a good definition of truth – reality. Let's take a look at ourselves. We are both a mind [by mind, I also mean spirit or soul] and a body and that whoever we are is inextricably interconnected to our nature as physical beings.

An examination of our tri-part brain will illustrate this point because our brain is intimately connected to both the thinking and the feeling parts of us. Our entire nervous system keeps us in touch with the outside world through the reception of our senses: sight, sound, touch, smell and taste. Without these five senses, we would have no perception of the world in which we live, much less any conception about that world. Our brain is part of that nervous system as is our autonomic nervous system which simply functions as an internal regulator keeping us breathing at a certain rate and our heart pumping blood throughout our body at a certain rate. The autonomic nervous system keeps us in balance within a “range of allowable imperfection” – or, “range of acceptable imbalance”. There is no “perfect center” to rates of breath and pulse.

Concepts like ‘imperfection’ or ‘imbalance’ arise in a different part of our brain. Underlying that wonderful apparatus of thinking called the *corpus cerebri* are two other centers of brain function: the *limbic* and the *mammalian*. At the risk of oversimplifying the brain's complex system, the limbic system can be thought of as the source of instinct, the mammalian system can be thought of as the source of emotion and the *corpus cerebri* is the source of both conceptual thought, analysis and intuition. The function of the *corpus cerebri* itself is integrated through the *corpus callosum* – the bundle of “wiring” between the two lobes of our right and left brain.

How does this all work?

There are two primary instincts: food and procreation. These two are the primary aspects that contribute to the survival of the individual [food] and the survival of the species [procreation] so it is important to satisfy both instincts.

There are two primary emotions: fight or flight. Both have to do with survival as well. The basic function of the fight or flight emotion is to ask a question: do we fight or do we flee? The answer to that question comes from the interaction of our right and left brain lobes. The right lobe gives us a picture of the answer along with our feelings about this answer [emotion], and the left lobe gives us the steps to the solution [intellect]. No thought is empty of emotional tone and that emotional tone contributes its share to the answer to the question ‘fight? run?’

But, we must remember that the first truth about who we are is that we are instinctual beings; the second truth is that we are emotional beings; the final truth is that we are intellectual beings. When we think, we are all these things at one and the same time.

Logical Vulnerability

Everyone who engages in argument has to deal with the problem of *logical vulnerability*, which refers to those areas about which people have difficulty being open-minded and rational. Logical Vulnerabilities reflect our blind spots, the kind of habitual attitudes or thought patterns that interfere with reaching a conclusion through the use of constructive argument.

Perceptual Blocks to Critical Thinking

The following is a short list of the areas that can become logical vulnerabilities. It does not begin to exhaust the possibilities.

- ❑ Personal Bias
- ❑ Stereotyping
- ❑ Lack of Correct Boundaries
- ❑ Arbitrary Boundaries
- ❑ Losing Track of the Issue
- ❑ Misquoting a Source
- ❑ Misattribution – citing the wrong source
- ❑ Plagiarism – not crediting actual source
- ❑ Ignoring Definitions
- ?

The Power Of Assumptions

Assumptions are those aspects of life which we tend to believe require no proof whatsoever. Very often they reflect our attitudes and beliefs about the nature of human life and values. Such *axioms*, which are source of the power of assumptions, are true in themselves and we tend to resist any challenge to that belief. This power of assumptions is what Socrates attacked with his argument that “An unexamined life is not worth living.” This could also be taken to mean: “an unexamined opinion is not worth having.” The positive aspect of these two statements is: (1) an examined life is worth living, and (2) an examined opinion is worth having.

If we treat assumptions as axioms which require no examination, it seems that we will arrive deductively at certain conclusions which may be valid as tautologies, but whose argument and conclusion are not sound because they are untrue. On the other hand, if we treat assumptions not as axiomatic, but as requiring careful, thorough examination, we must reason inductively so as to arrive at conclusion(s) which can only be probably true, never certain.

What difference does this make? For instance, the opening paragraph offers a description of assumptions and that description contains an assumption. If this assumption is regarded as axiomatic, we would not bother to examine it. But Socrates would argue that we ought to examine this assumption that “assumptions tend to be treated as axioms”. Consequently, it seems appropriate to examine what an axiom is or can be (as normally set forth in human discourse). We are to examine what is *axiomatic*, i.e. true in itself. *Webster’s New World Dictionary of the American Language, Second College Edition*, The World Publishing Company, New York, 1970, offers the following on *axiom*: “[Gk *axioma*, from *axion* to think worthy] 1: a statement universally accepted as true; maxim 3: *Logic, Math.* a statement that needs no proof because its truth is obvious; self-evident proposition.” (98)

Axioms and assumptions are (always, sometimes) regarded as *postulates*. On page 1114 in Webster's, we read "to assume without proof to be true, real, or necessary, esp. as a basis for argument". Now, accepting these dictionary definitions, we have a point of departure – an assumption of self-evident truth which does not require proof. As the Webster's definition of "assumption" states – we suppose that our assumed axiom is true. Consequently, it seems that the initial two paragraphs of this commentary are accurate.

The issue is a simple and direct consideration of immense importance to human life. Stated as a proposition, this is the issue: any, each and every assumption we make which we fail to submit to examination in terms of evidence becomes an assumption which is axiomatic; and, being axiomatic, it must be considered incorrect until it is examined in light of the pertinent, relevant evidence. In other words, there is nothing which is true in itself, therefore, there is nothing which is axiomatic. Consequently, we are not entitled to make any assumptions about anything. This means that even our most cherished opinions are not worth having unless and until we submit those opinions to the light of pertinent and relevant evidence. We thus must decide what is evidence that is pertinent and relevant and how much of that evidence we need.

Returning to Webster's, *evidence* is: "something that tends to prove; ground for belief" or "plainly visible or perceptible" (486) ["in evidence"]; being "plainly visible" would seem to imply that it is capable of being public knowledge. *Pertinent* is defined as: "having some connection with the matter at hand; relevant; to the point". (1063) *Relevant* is defined as: "bearing upon or relating to the matter in hand; pertinent; to the point". (1199) But, there is more. *Relevant* implies a close logical relationship with, and importance to, the matter under consideration; *pertinent* implies an immediate and direct bearing on the matter in hand; *apposite* applies to that which is both relevant and happily suitable or appropriate; *applicable* refers to that which can be brought to bear upon a particular matter or problem; *apropos* is used of that which is opportune as well as relevant.

In summary, if we have never examined our belief system, which profoundly shapes how we conduct our lives, we have omitted a most important constituent of what it means to be a human.

The Importance of Using Precise Language

The structures of language serve both rhetorical and logical purposes and work through such elements as systems of punctuation, word order or usage, and style. For example, the placement of a comma can either indicate a pause in thought (rhetorical), the end of a clause (both logical and rhetorical) or it can function to clarify the logical relationships between the parts of a sentence. Precise use of language can help to avoid such problems as:

- **Confusing related but distinct concepts**, e.g. confusing *possibility* with either *probability* or *plausibility*.
- **Ambiguity**: there are two or more possible interpretations of a word's (or phrase's) meaning, neither of which is obviously correct. Not to be confused with *vagueness* which involves a problem with determining whether or not the word fits the situation, e.g. *Equivocation* is a fallacy in which the meaning of a word shifts significantly during the argument. *Banks are places that have money in them. Rivers have banks. Therefore, rivers have money in them.*

The Necessity of Reading Carefully and Critically

In *How to Read a Book*, Mortimer Adler and Charles Van Doren observe that there are four levels of reading: 1. **Elementary**, 2. **Inspectional**, 3. **Analytical**, and 4. **Syntopical**. Each level builds cumulatively on the preceding ones as the higher levels include and refine the skills of the lower ones.

The first level of reading is called **elementary reading** and involves the simple activity of determining what the words mean in their written forms. The visual marks on the page are translated into language.

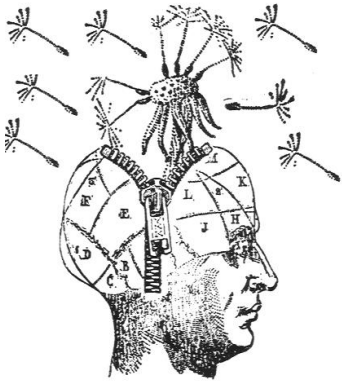
The second level of **inspectional reading** is characterized by the need to complete a certain amount of reading in a certain length of time. This level is sometimes called ‘*skimming*’ or ‘*pre-reading*’ and it is useful for determining what kind of book it is and what it is about before reading it more thoroughly. Neither elementary nor inspectional reading involves any kind of real creative thought because they are concerned with gathering information rather than developing understanding.

However, the analytical and syntopical levels of reading offer greater scope for creative activity because they require understanding as well as comprehension of information.



The third level of **analytical reading** demands a careful thorough reading. Because such understanding implies the act of interpreting the author’s meaning, identifying key words and their meanings as well as determining what questions or problems the writer is addressing are two important ways to **read critically**. The thoroughness necessary in analytical reading offers a useful model for pursuing research in the *saturation* stage of the creative process.

Syntopical reading, which is the fourth level, provides the best opportunity to read creatively because such reading **involves creating a synthesis of more than one than one text or writer**. In syntopical reading, the subject under investigation is the center of attention rather than any individual book on that subject. In this kind of reading, the emphasis shifts from concern for what another writer has to say to a concentration on developing your own thoughts on a subject. The reader engaged in this kind of reading is testing her own thoughts against the ways in which other people have considered the same subject. Because it offers a useful method for processing the understanding gained through analytical reading, syntopical reading is a useful tool particularly appropriate to the third stage of the creative process, *incubation*. Syntopical reading is a potent form of creative work which is usually a necessary basis for creative thinking in philosophy, history, the humanities or the sciences.



ANALYZING ARGUMENTS

The basic process of analyzing argument has three steps. These steps must be followed in order to be effective because each step uses the results from the previous step.

SCHEMATIZATION/INTERPRETATION: What does the argument say? What is the conclusion? (only one/argument) What are the premises? How is it structured?

In any interpretation the **PRINCIPLE OF FAIRNESS** which is a combination of **charity** (putting argument in best possible light) and **faithfulness** (not tampering with the argument by either adding or leaving out critical parts) governs the process. **The Principle of Fairness states that the argument must be interpreted in such a way as to give the author the most cogent argument possible which can be supported by the textual and contextual evidence.**

INFERENCE ANALYSIS: Is the connection between premises and conclusion relevant? What are some possible problems with the inferential connection? (Informal fallacies) What kinds of arguments are there? Do different arguments have different standards for relevance?

How do you go about evaluating the inference strength? Classification and analysis of types of argument will provide the most useful means to evaluate arguments. In the first step, you schematize the basic pattern of premises and conclusion by using common sense and language cues. This basic schema is then analyzed to determine whether the argument is deductive, abductive, inductive, or normative. You need to know the kind of argument you are dealing with because each argument type has its own strategies for determining inference strength which are described under the sections on the different argument types.

PLAUSIBILITY ANALYSIS: Is the argument convincing? What do you have to know in order to evaluate the probable truth of the premises? (This component may involve further argument analysis.)

Argument Analysis Step by Step

NOTE: Please do these steps in order and do not try to take shortcuts. Each step depends on the previous one and so errors made in beginning will inevitably affect the final results of the analysis.

SCHEMATIZATION Step 1 involves **critical reading** which means that you will have to read the argument more than once or even twice as well as determine the conclusion and premises.

STEP 1: Find conclusion(s) and main premises. [I start with the conclusion and work backwards to find the premises] Write them down, summarizing if necessary. Use your results to diagram argument's structure.

INFERENCE ANALYSIS Steps 2 through 4 involve **critical evaluation** of the argument.

STEP 2: Determine what kind of argument is being made on the basis of the kind of premises and their relationship to the conclusion. For example, if the premise is a phenomenon needing explanation and the conclusion supplies that conclusion, what kind of argument is it?

STEP 3: Determine if the argument is strong or weak (if deductive, valid or invalid) using the method appropriate for the kind of argument you have. At this point remember you don't have to decide (or know) whether or not the premises are actually true.

STEP 4: Check for fallacies. Include criteria for language use, relevance, adequacy and definitions. If you have detected a fallacy, the argument is automatically weak and, if it is a deductive argument, unsound.

PLAUSIBILITY ANALYSIS Steps 5 and 6 involves determining whether a strong inference is supported by true premises. This is the stage where you decide how cogent the argument is. This decision should influence whether or not you agree with the conclusion and what to do about defending your choice.

STEP 5: If you have a strong argument, determine if its premises are true. This is a good time to look at the original argument structure to see if there is a weakness in any of the main premises. Check for fallacies of false premise. This step may also involve additional arguments supplied by you from your knowledge/experience.

STEP 6: If the argument turns out to be cogent, try to determine how you would argue against it. This step supplies an additional check on our all too human tendency to see arguments we agree with as cogent and arguments we disagree with as uncogent.

Argument Analysis Example:

The argument:

Plagiarism occurs when a student uses another person's ideas or words without properly citing the source of that material. Any fact, idea, summary, paraphrase, or quotation from another's work and included in your paper must be documented through proper citation. Any quoted piece of information not set off with quotation marks must be in your own words. Otherwise, even if you name your source, you plagiarize by stealing the original phrasing. **Consequences:** Any student who plagiarizes any source including the textbook will automatically receive zero credit for the assignment (without any opportunity for resubmission) and may receive a failing grade for the course and/or be brought up on charges of academic dishonesty before the UOP Ethics Committee.

SCHEMATIZATION:

Premise 1: Failure to give credit to sources of information through proper citation of those sources can be considered plagiarism. (definition LB Handbook)

Premise 2: Any student who is guilty of plagiarism will receive zero credit for the assignment (without any opportunity for resubmission) and may receive a failing grade for the course and/or be brought up on charges of academic dishonesty before the UOP Ethics Committee. (syllabus)

Conclusion: Therefore Any student who fails to cite information properly will run the risk of receiving zero credit for the assignment, may receive a failing grade for the course and/or be brought up on charges of academic dishonesty before the UOP Ethics Committee.

INFERENCE ANALYSIS:

- P1: ^A If [any student fails to cite sources correctly], ^B **then** [he/she is guilty of plagiarism].
- P2: ^B If [a student is guilty of plagiarism], ^C **then** [he/she will run the risk of receiving zero credit for the assignment, may receive a failing grade for the course and/or be brought up on charges of academic dishonesty before the UOP Ethics Committee.]
-
- C: ^A **If** [any student fails to cite sources correctly], ^C **then** [he/she will run the risk of receiving zero credit for the assignment, may receive a failing grade for the course and/or be brought up on charges of academic dishonesty before the UOP Ethics Committee.]

Valid Deductive Argument: Hypothetical Syllogism →
Strength: Certainty = Very Strong
No fallacies

If A then B If B then C If A then C

PLAUSIBILITY ANALYSIS: Sound Argument (cogent)

P1 is true by definition (Authority LB Handbook), P2 is true (according to course syllabus) and Hypothetical Syllogism is Valid Deductive Argument form so argument is sound.

SCHEMATIZATION

How To Schematize An Argument

Read the argument at least twice. On the first reading, try to figure out what the argument is about; background information may be necessary to even begin to understand what is being discussed. On the second reading, state what you think the point of the argument is (conclusion) and what evidence/support (premises) is offered for that conclusion.

Language Clues for Argument Analysis:

The following words can help in schematization by identifying parts of the argument.

Conclusion indicator words/phrases:

THEREFORE	ENTAILS THAT	IMPLIES THAT
HENCE	WE MAY	IT MUST BE THAT
WHENCE	CONCLUDE	IT FOLLOWS THAT
ACCORDINGLY	SO	THUS
CONSEQUENTLY	WE MAY INFER	

Premise indicator words/phrases:

SINCE	BECAUSE	FOR THE REASON THAT
IN THAT	MAY BE INFERRED	IN AS MUCH AS
SEEING THAT	FROM	FOR
AS INDICATED BY	AS	GIVEN THAT

WRITE OUT THE MAIN PREMISES AND CONCLUSION. I like to begin by identifying the conclusion and then looking for statements that support that conclusion. **Summarize carefully.** Be sure and include all the relevant information but check to be sure you are not adding anything additional to the argument. Be particularly careful to state the conclusion as precisely as possible. – this is the **Principle of Fairness** in operation.

Estimate the number of Main Premises:

Note: These premises may form a smaller subsidiary argument, they may be restatements of the same idea or concept or some combination of these two basic relationships.

- ✓ Count the number of concepts which are part of the conclusion.
- ✓ Add a possible premise dealing with the relationship between these concepts. [This premise may be implicit rather than explicitly stated.]
- ✓ Divide your premises according to which concept they apply/support/express and condense multiple premises into a single main premise.

Applying the Principle Of Fairness:

- AVOID premature plausibility analysis. Assume the premises are true at this point, you can argue with them later.
- ASSUME that the argument is good and use that assumption to understand it.
 - Consider the argument as a whole. If you assume the argument is weak (contradictory etc.) then it becomes much more difficult to find interpretations that could make it strong. If there seems to be a gap, for example you thought you were understanding up to that point but suddenly it stops making sense, try a couple of different approaches:
 1. Check to see if there is an alternative interpretation of the preceding argument that will make sense of the problem by closing the gap. If that doesn't work, check to see if you can figure out an *implicit* premise that will fill in the gap.
 2. TRY to use as many direct citations from the original text as possible. Sometimes you will need to add 'reminder notes in brackets [] to help you keep track.
 3. Paying attention to language can also help to clarify the differences between premises and conclusions as well as provide clues to differences between the different kinds of argument types, which is useful for inference analysis.
 4. Use the conclusion to help you identify what kind of information you need in the premises in order to support the conclusion. If you think some important piece of support is missing, consider the possibility that another premise implies that information. If you can't find a conclusion, consider the possibility that it is implicit before assuming that one of the premises has to be the conclusion. The context/background of the argument is very important here in determining what to do.

Evaluating Arguments

In order to determine the cogency (believability) of an argument, you need to evaluate two things: the amount of support the premises of the argument offer to the conclusion

[Inference Analysis] and the plausibility of the premises themselves [Plausibility analysis].

BOTH of these aspects make crucial contributions to the overall strength of the argument. For example, if the premises offer little support for the conclusion but are highly plausible, the argument is still weak and therefore uncogent. If, on the other hand, the premises offer a great deal of support for the conclusion but turn out to be false or implausible, then the argument again fails to pass criteria for cogency.

To be considered Cogent, an argument must meet the following three test criteria:

- ✓ Are its premises **relevant** to the conclusion? [Inference analysis]
- ✓ Do its premises provide **enough** information to support the conclusion?
[Inference analysis]
- ✓ Are its premises **true**? [plausibility analysis]

The following argument illustrates how to use these three criteria in determining an argument's cogency. The following example demonstrates the two different uses of counterexample.

Argument: It is useless to kill flies. The ones you kill will be the slowest, because the fastest ones will evade you. So you will be killing off the slowest ones, and fastest ones will remain. Over time, then the genes for being fast will predominate. Then with super-fast flies, it will be impossible to kill them anyway. So it's useless to kill flies.

Schema:

P1 The flies you kill will be the slowest, [because the fastest ones will evade you]. Note the mini argument here! *Premise indicator*

P2 If you kill off the slowest ones, the fastest ones will remain to breed. [This is a conditional statement but not a deductive argument.]

P3 Over time a super fast fly will evolve that will be impossible to hit.

So it's useless to kill flies.

Determining the **Inference Strength** using the Method of Alternative Conclusion:

Alternative conclusion: *Even if it becomes difficult, it is not useless to kill flies because if their population is left unchecked, they spread disease.* [This alternative conclusion is a counterexample for the original conclusion because both conclusions can't be true.]

This conclusion was very easy to draw and is also supported by the premises so the inference strength of the argument is weak. [Note: the fact that the premises do not necessarily contradict the conclusion means that this argument CANNOT be a valid deductive argument]

Determining the **Plausibility of the Premises** using counterexamples:

Counterexamples to Premises:

P1 and P2: You are not necessarily killing the slowest flies, only those which enter your house.

P3 a. "Over time" in evolutionary terms is generally measured in thousands of years and other factors could prevent the development of a super fly.

b. Being super fast is useless against pesticides or fly strips.

Counterexamples

The process of argument analysis uses counterexamples at two different points in the process of argument analysis. One use of counterexample occurs during inference analysis and the other during plausibility analysis.

Counterexamples during Inference Analysis

1. Deductive Counterexamples are used in the inference analysis of **deductive arguments** to determine whether or not an argument form is valid. This kind of formal counterexample always takes the form of demonstrating that a case exists in which true premises lead to a false conclusion.
2. In inference analysis of **inductive arguments**, counterexamples are used as part of the method of alternative conclusions. The alternative conclusion is a form of counterexample because both conclusions cannot be true. Counterexamples can also help test whether or not a sample is representative by providing cases that don't fit the generalization. They can also be used to determine if an analogy is relevantly similar. Finding a counter analogy would suggest that the original analogy might be inadequate in some way.
3. In the inference analysis of **abductive arguments**, counterexamples used to test which hypothesis is most plausible by eliminating the others.

Counterexamples during Plausibility Analysis

Counterexamples are a good way to test the plausibility of the premises during plausibility analysis. In this case, a counterexample is information or an interpretation that calls the truth of the premise into question. A good example of this process is found in the movie 12 Angry Men. During their deliberations, the jury is testing the prosecution's case by finding counterexamples that re-interpret the evidence to test its plausibility. In the course of their analysis, each of the main arguments of the case is reviewed and evaluated. As a result of their analysis, they find reasonable doubt and so acquit the defendant. Another way counterexamples can be useful is in evaluating universal claims and generalizations. The following example of a valid deductive argument fails to be plausible because one of its premises is false.

All dogs bark.	→	Valid Categorical Form: All D are B
<u>This animal is a dog.</u>	→	<u>x is D</u>
This animal barks.	→	x is B

The first premise makes a universal claim. Since such claims admit of NO exceptions, the counterexample of Basenjis, which are a kind of dog that doesn't bark, makes the truth value of this premises 0 and so the argument is valid but not sound.

Counter Arguments

One of the most famous arguments by analogy is the "argument from design," used to defend the belief in the existence of God. The passages below are from a work by the eighteenth-century philosopher David Hume. The first one is a statement of the argument itself; the second is a counter-analogy to the argument. Which side of this debate is more persuasive?

1. "Look round the world: Contemplate the whole and every part of it: You will find it to be nothing but one great machine, subdivided into an infinite number of lesser machines, which again admit of subdivisions to a degree beyond what human senses and faculties can trace and explain. All these various machines, and even their most minute parts, are adjusted to each other with an accuracy, which ravishes into admiration all men who have ever contemplated them. The curious adapting of means to ends, throughout all nature, resembles exactly, though it much exceeds, the productions of human contrivance-of human design, thought, wisdom, and intelligence. Since therefore the effects resemble each other, we are led to infer, **by all the rules of analogy**, that the causes also resemble, and that the Author of Nature is somewhat similar to the mind of man, though possessed of much larger faculties, proportioned to the grandeur of the work which he has executed."
2. "Now, if we survey the universe, so far as it falls under our knowledge, it bears a great resemblance to an animal or organized body, and seems actuated with a like principle of life and motion. A continual circulation of matter in it produces no disorder; a continual waste in every part is incessantly repaired; the closest sympathy is perceived throughout the entire system; and each part or member, in performing its proper offices, operates both to its own preservation and to that of the whole. The world, therefore, I infer, is an animal; and the Deity is the soul of the world, actuating it, and actuated by it."

[David Hume, *Dialogues Concerning Natural Religion*]

These two analogies can't be equally true or plausible. This forces you to choose one over the other and there are real consequences to the choice. If you believe the world is a machine, you tend to treat it differently than if you believe it is a living organism. The difference in attitude has resulted in many of the environmental problems we are facing today. Deciding which is the most "relevantly similar" analogy therefore can be very important.

The Three Parts of Inference Analysis

The second stage of argument analysis, Inference Analysis involves three parts, which are done in the order listed.

- 1) Determining what kind of argument you are dealing with by using the kind of information offered by the language used in premises and/or conclusion.
- 2) Determining the inference strength of the relationship between premises and conclusion using the method appropriate for the particular type of argument being analyzed.
- 3) Determining if any fallacies have been committed. Fallacies describe errors in the inference pattern of the argument. They do not refer to the truth-value of premises or the plausibility of the argument.

Argument Types

There are three main types of reasoning called **Deductive**, **Inductive** and **Abductive**. These arguments are identified by their particular structure as well as the role they play in the whole reasoning process. In addition, there are two additional argument forms, **Arguments from Authority** and **Normative Arguments**, which are identified by the use of a particular kind of premises in the argument. Arguments from Authority rely on a source of authority as a guarantee of their plausibility while Normative Arguments make an appeal to a standard of value or belief to as the final criteria for judgment.

ABDUCTIVE

Possible Explanation/ Diagnostic

- 1) reference to cause or explanation (either implied or explicit) in the argument
- 2) the premises seem to be a report of phenomena
- 3) Conclusion is possible cause or explanation

INDUCTIVE Predictive

Generalization From Example

1. verb 'will' as future tense suggests a prediction
2. appeal to statistics
3. a list or reference to a class of things/events

Analogy

- 1) use of the word 'like'
- 2) comparisons -- particularly of two sets of properties

DEDUCTIVE

- 1) premises/conclusion are conditionals (if/then statements)
- 2) arguments about relationships between classes/categories and/or individuals (all/some/none)
- 3) arguments about definitions

The following arguments can be in any of the 3 main types.

AUTHORITY

makes direct appeal to authority as guarantor of truth of premises authority is source for information that supports the conclusion

NORMATIVE choice implied or offered by conclusion (should/ought)

The Difference between Deductive, Abductive and Inductive Arguments

A priori and a posteriori

A simple exercise may serve to demonstrate the difference between *a priori* and *a posteriori* methods of thinking. *A priori* is reasoning which is done before the fact [deductive]; *a posteriori* reasoning is done after the fact [Inductive, Abductive].

One of the following sentences is *a priori*, and one is *a posteriori*. Which is which?

1. If the instructor assigns grades based upon what each student has earned in relation to other students, then each student will receive a fair grade.
2. If the instructor assigns grades based upon what each student has earned independently of other students, then each student will receive a fair grade.

Is statement 1 *a priori* or *a posteriori*? And which type of reasoning is statement 2.?

Consider what is being said:

- In the **first statement**, the students' grades [and each individual student's grade] will be based upon the relationship of the work all of the students do. The instructor, who grades the work of the students, must wait until the work is received from all students before determining the grade of each student in relation to the work done by every other student. This means that it has been determined prior to the fact that the grade of each student is based upon the relative quality of work and not upon the absolute quality of work.
- In the **second statement**, the instructor, who grades the work of the students, must wait until work is received from each student before determining the grade earned by a particular student. This means that no grade has been determined prior to the fact. In the second statement, each student's grade will be based solely on the work done by that particular student.

Statement one is the grading measurement of the so-called "curve" in which student grades are relegated along predetermined ranking. If there were 30 students in the class, the "curve" would require that 3 students receive "A", that 6 students receive "B", that 12 students receive "C", that 6 students receive "D", and that 3 students receive "F". Since this is a predetermined distribution of grades, statement one represents *a priori* reasoning. The grades are determined **before the fact** based upon a relationship which requires that 10% of all students are excellent (A) and 10% of all students fail (F); that 20% of all students do good work (B) and 20% of all students do poor work (D); and, that 40% of all students do average work.

Statement two is represents *a posteriori* reasoning. The grade for each student is determined **after the fact** based upon the quality of the work done by that particular student independently of the quality of the work done by all students. That is, there is not a predetermined distribution of grades.

How the Three Main Types of Reasoning Work Together

The three main types of reasoning can be regarded as basic reasoning methods or strategies. Taken together, these three approaches to thinking make up the full range of the scientific method. Deductive and inductive reasoning are addressed by your textbook and your module. Abductive reasoning is not. That is unfortunate. Each method of reasoning seeks and concludes in a particular type of result.

- **Deductive thinking leads to certainty.**
- **Inductive thinking leads to probability.**
- **Abductive thinking leads to possibility.**

Deductive reasoning seeks and concludes in certainty. *Certainty* does not mean “absolutely true”. This is very IMPORTANT! The primary concern with deductive reasoning involves form, or pattern or structure, NOT content. If the structure of the argument is valid, then you will be able to determine whether or not the conclusion is true with certainty. If the structure of the argument is invalid, you must use a different kind of argument to reach a reliable conclusion. Once you have determined that you are using a valid deductive form, your evaluation of the truth of the conclusion becomes dependent on determining the truth of the premises because soundness requires more than a valid argument structure. Soundness demands that the argument has a valid form and that all the premises in the argument are true. So you still need to determine the truth of the premises.

How do you determine if all the premises are true? Only by **inductive reasoning**! But, the best you can obtain from inductive reasoning is an extremely high degree of probability. Therefore, we can never arrive at THE TRUTH with absolute certainty. Inductive reasoning relies upon evidence: evidence that is relevant, enough evidence to allow a generality, and evidence that is correct in that it can be verified. This need to use inductive reason leads to **abductive reasoning**. With abductive reasoning we seek possibilities, and/or we reason from effect to cause [*retroduction*]. Abductive reasoning allows us to develop a hypothesis, i.e. a possible explanation, which we can test inductively.

Deductive (tautological) reasoning does not teach us anything new, it only teaches us what is involved in what we know (or assume) already. **Inductive** (empirical) reasoning teaches newness through synthesis of what we know already, and thus represents new knowledge to an extent. **Abductive** reasoning allows us to speculate upon and capture the possible and thereby create new hypotheses, which we can then subject to empirical (probability) and tautological (syllogistic certainty) evaluation. This scientific method is helpful in discovering, learning and validating any knowledge, which is deemed of value – whether that value has to do with science, ethics, religion or any other type of argument.